

Article
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After amendment of claims under Article 19 (1)

CLAIMS

1. A refrigerator unit characterized by comprising:

means, which is provided between a power source and a

5 motor for driving an intake/exhaust valve managing an
intake/exhaust cycle time of a refrigerator unit, for varying
a frequency of the motor for driving the intake/exhaust valve;

a temperature sensor for detecting a temperature of a
thermal load unit of the refrigerator unit; and

10 a controller for controlling the means for varying the
frequency of the motor for driving the intake/exhaust valve in
accordance with an output signal of the temperature sensor.

2. A cryopump characterized by comprising the
refrigerator unit according to claim 1.

15 3. A cryogenic refrigerator characterized by using a
compressor unit comprising:

means, which is provided between a power source and a
compressor main body motor of the compressor unit, for varying
a frequency of the compressor main body motor;

20 a high pressure sensor attached to a high pressure
refrigerant pipe connecting an outlet of the compressor main
body with a refrigerant supply port of the refrigerator unit;

a low pressure sensor attached to a low pressure
refrigerant pipe connecting an inlet of the compressor main
25 body with a refrigerant discharge outlet of the refrigerator

unit;

a controller for controlling the means for varying the frequency of the compressor main body motor in accordance with output signals of the high pressure sensor and the low

5 pressure sensor, and

characterized in that a plurality of the refrigerator units according to claim 1 and one or more of the compressor units constitute the cryogenic refrigerator.

4. A cryogenic refrigerator characterized by using a
10 compressor unit comprising:

means, which is provided between a power source and a compressor main body motor of the compressor unit, for varying a frequency of the compressor main body motor;

a differential pressure sensor provided between a high
15 pressure refrigerant pipe connecting an outlet of the compressor main body with a refrigerant supply port of the refrigerator unit and a low pressure refrigerant pipe connecting an inlet of the compressor main body with a refrigerant discharge outlet of the refrigerator unit;

20 a controller for controlling the means for varying the frequency of the compressor main body motor in accordance with an output signal of the differential pressure sensor, and

characterized in that a plurality of the refrigerator units according to claim 1 and one or more of the compressor
25 units constitute the cryogenic refrigerator.

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5. A cryopump characterized by comprising the cryogenic refrigerator according to claim 23 or 34.

6. The cryopump according to claim 5, comprising:

a temperature sensor for detecting a temperature at any optional position of a cryopanel of the cryopump; and

a controller for controlling the means for varying the frequency of the motor driving the intake/exhaust valve managing the intake/exhaust cycle time of the refrigerator unit in accordance with an output of the temperature sensor.

7. A superconductive magnet characterized by comprising the refrigerator unit according to claim 1.

8. A super conductive magnet characterized by comprising the cryogenic refrigerator according to claim 23 or 34.

9. The superconductive magnet according to claim 7 or 8, comprising:

a temperature sensor for detecting a temperature of any optional position of the superconductive magnet; and

a controller for controlling the means for varying the frequency of the motor driving the intake/exhaust valve managing the intake/exhaust cycle time of the refrigerator unit in accordance with an output of the temperature sensor.

10. A cryogenic measuring apparatus characterized by comprising the refrigerator unit according to claim 1.

11. A cryogenic measuring apparatus characterized by comprising the cryogenic refrigerator according to claim 23 or

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34.

12. The cryogenic measuring apparatus according to claim 10 or 11, characterized by comprising

a temperature sensor for detecting a temperature of any optional position of the cryogenic measuring apparatus; and a controller for controlling the means for varying the frequency of the motor driving the intake/exhaust valve managing the intake/exhaust cycle time of the refrigerator unit in accordance with an output of the temperature sensor.

13. A simple liquefaction apparatus characterized by comprising the refrigerator unit according to claim 1.

14. A simple liquefaction apparatus characterized by comprising the cryogenic refrigerator according to claim 23 or 34.

15. The simple liquefaction apparatus according to claim 13 or 14, comprising:

a temperature sensor for detecting a temperature of any optional position of the simple liquefaction apparatus; and

a controller for controlling the means for varying the frequency of the motor driving the intake/exhaust valve managing the intake/exhaust cycle time of the refrigerator unit in accordance with an output of the temperature sensor

16. The simple liquefaction apparatus according to claim 13 or 14, comprising:

liquid-level detecting means within a liquid storage

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container of the simple liquefaction apparatus; and

a controller for controlling means for varying a
frequency of a motor driving an intake/exhaust valve managing
a intake/exhaust cycle time of a refrigerator unit in

5 accordance with an output of the liquid-level detecting means.